Assimilation of **TOPEX/POSEIDON** Sea **Level Data** Into a Global **Ocean** Circulation Model

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A study of large-scale global ocean circulation based on TOPEX/POSEIDON (T/P) altimeter data will be presented, Temporal variations of the circulation are estimated by assimilating T/P sea level measurements with a wind- and thermodynamically-driven three-dimensional nonlinear primitive equation model. The numerical model is based on the GFDL Modular Ocean Model and covers the world ocean from 80°S to 80°N with realistic coastlines and bottom topography. An approximate Kalman filter is devised to allow near optimal yet practical assimilation of data for the model. The estimation method consists of employing a time-asymptotic limit and a dimensional reduction of the associated model error covari ante matrix. The synthesis provides a dynamic interpolation and extrapolation of the altimetric measurements, resulting in a more complete ocean circulation estimate than either model simulation or T/}' measurements alone. Large-scale, basin-wide sea level variations ar e resolved along with associated barotropic and baroclinic changes in the circulation. Fast barotropic sea level variations are found at mid to high latitudes while low latitude sea level changes are due primarily to baroclinic evolution of the ocean, Some of the sea level fluctuations at high-latitudes have periods shorter than 3-days, which are faster than the 10-day repeat period of T/P. Comparisons with independent in situ measurements validate improvements made in the model estimate including its subsurface circulation, Formal error estimates are obtained and used to measure consistencies of the estimates with the data. Dynamics of the T/P assimilated estimate and their relation to atmospheric forcings will be explored.

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